Warm–up Assignment

**Exercise 1: Graphs**

Given the weighted graph $G$ below. Represent $G$ by an adjacency matrix.

Exercise 2: Induction

A connected graph is a *tree* if and only if does not contain any cycles. How many edges does a tree with $n$ vertices have. Proof by induction.

Exercise 3: More proofs

For an undirected Graph $G = (V, E)$ the complementary Graph $\overline{G} = (V, \overline{E})$ is defined by

$$\overline{E} := \{\{v, w\} \subseteq V : v \neq w, \{v, w\} \notin E\}.$$ 

Prove or disprove the following statements:

(a) $G$ is not connected $\Rightarrow$ $\overline{G}$ is connected

(b) $G$ is connected $\Rightarrow$ $\overline{G}$ is not connected